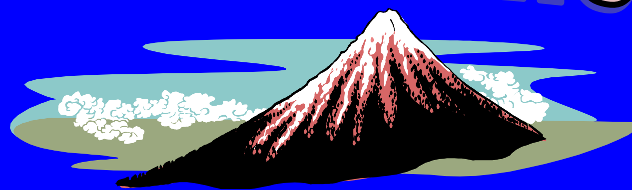
Peak Performance



NWS Office of Climate, Water, and Weather Services
Silver Spring, Maryland

This Issue:

Fine Tuning Your Warning Valid Times to Better Help Product Users

By Brent MacAloney, NWS Headquarters

Recently, someone asked me about the *Timing Error* scores that are shown on the long duration (i.e., winter storm, coastal flood, and high wind) stats on demand reports. The user wanted to know exactly how those scores were calculated and how they could be used to improve warning accuracy. After answering the question, I decided this was a great topic to discuss in this edition of the Peak Performance Newsletter, so others might benefit.

Let me start off by giving you a little background on long duration warning verification in the National Weather Service (NWS) and how we came up with the verification methods. Back in 2006, I was tasked with coming up with the requirements for an automated process that the NWS could use to verify winter storm and high wind warnings. Up until that point, all winter storm and high wind warnings were verified by hand at the forecast office level. This needed to be completed by October 2007, when it became mandatory for all long duration warnings to include Valid Time Event Code (VTEC) strings.

Over the next few months, I talked to many individuals and sought their input on what would be helpful to show on the verification reports. I was not just interested in obtaining feedback from the forecasters and program managers at

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headquarters, but also from the people who use the NWS's long-duration warnings. I figured if anyone had positive feedback it would be those individuals who make decisions based on these products. This included school district office workers who make decisions on whether school will be cancelled, airport managers who call in extra staff to clean runways, and department of transportation employees who make the decision on when to call in the snowplows. Across the board, I heard the same thing. "The VTEC valid time is extremely important to all of our operations!"

After additional conversations with these individuals, I discovered that the majority of their operations and decision making hinged on "when frozen precipitation was going to start" and to a lesser extent, "when frozen precipitation was going to end." It had nothing to do with arbitrary times like the time the area met warning criteria. Yet, for all these years, the NWS has based the verification and lead time of the event on when criteria was met. There needed to be a score that allowed the agency and the forecasters to measure the accuracy of the times in the VTEC string. This was the beginning of the NWS implementing the practice of *calculating* Timing Error scores.

Now that you know why we calculate the Timing Error scores, you probably want to know how they are calculated. It's best to start with how the verifying events are logged in storm data. When it comes to winter storm events (i.e., blizzard, winter storm, heavy snow, ice storm), there are "three different event times" logged in storm data in association with these events:

1) **Beginning Date/Time**:

   This was the time that the event began to have some impact. In a lot of cases, with snow events, this is the time the snow started to stick to the ground.

2) **Criteria Date/Time**:

   This is the time that the event met the locally defined warning criteria.

3) **Ending Date/Time**:

   This is the time that the event ended. In a lot of cases, with snow events, this is the time it stopped snowing.

When it comes to the other long duration events we verify (i.e., high wind, coastal flood, and lakeshore flooding), we only collect two event times, the beginning date/time and the ending date/time. For the purpose of lead time and determining whether or not an event is warned, we use the *criteria time*. Timing error works differently in that we are trying to capture the difference between the original warning's VTEC beginning time (i.e., the time our forecasters are telling people that the impact will begin) and the time that the event begins (i.e., the time there is actually impact in the area).

Let me show an example so you can see what I'm talking about.

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An office issues a warning with a valid beginning time of 2300z on January 7, 2012, taken from VTEC as shown in **(Figure 1)**.

Per the storm data entry, the verifying event was listed as having a beginning date/time of 2130z on January 7th, 2012.

The formula for calculating the event's timing error is:

⇒ (Event Beginning Time) - (VTEC Beginning Time of first warning)

So you have…

⇒ (2130z on 1/7/2012) - (2300z on 1/7/2012) = -90 minutes or -1.5 hours.

Notice the negative timing error in the example. This means that the event began before the warning was valid. In talking to the users of the long duration warnings, they informed us that the higher the negative timing error, the bigger impact it has on their operations. The main reason given was that they often had to play catch-up on the events that had impact prior to when the forecast stated it would, especially with the frozen precipitation events. If the event had started after the VTEC beginning time, you'd have a positive number in the timing error.

So what does that mean for the timing error at your office? To be honest, no one is going to have a zero minute timing error, so having a perfect score here should not be your goal. However, if you see your office having a *negative* average timing error and a *high* absolute timing error, you may want to modify future warnings so that they begin an hour or so (your absolute timing error should tell you this) earlier than you normally would. One of the side effects of improving your timing error is that it should have a positive impact on your office's lead time, as many of the events with a negative timing error also have a zero minute lead time.

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WWUS41 KWSH 071200
WSWWSH

URGENT - WINTER WEATHER MESSAGE
NATIONAL WEATHER SERVICE SILVER SPRING MD
700 AM EST SAT JAN 7 2012

MDZ999-081500-
/O.NEW.KWSH.WS.W.0001.120107T2300Z-120108T1500Z/
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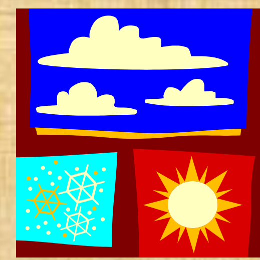
Figure 1: Warning with a valid beginning time of 2300z on January 7, 2012 (taken from VTEC).

Fly…with Ointment



Beth McNulty, NWS Headquarters

In the Fall 2011 issue of Peak Performance, we looked at an overview of the Quality Management System (QMS) concept adopted by the Federal Aviation Administration (FAA), and supported by the National Weather Service (NWS) for aviation products. Now let's look at how the concept works.

QMS has documentation requirements, but QMS is NOT in the documentation. Instead, QMS is a system of managing the development and production of products (in this case: weather products and services) to meet user requirements. For system management to work, the organization management structure must be actively involved and everyone needs to understand the importance of the requirements driving product production.

In the world of NWS aviation weather services, the forecaster is often the face of the product. This is especially true for those products or services provided directly, via personal contact, to the FAA user. Other products and services, such as the Weather Forecast Office (WFO) Terminal Aerodrome Forecasts (TAFs) or Aviation Weather Center/Alaska Aviation Weather Unit/Meteorological Watch Office (AWC/AAWU/MWO) significant hazards may seem more remote from the ultimate user, but the presentation format and the reliability of the forecast influence the user's perception of quality.

A "quality" management system must provide the best product or service possible with the resources and organizational structure at hand that satisfy the user requirements.

In the next edition of Peak Performance, we will examine the following areas of the Quality Management System:

⇒ How do customer requirements get into product design?

⇒ What is product realization? (a definition).

Service Assessment Program

By Sal Romano, NWS Headquarters

One service assessment was publicly released and two service assessments are on-going as of February 2012. Here is a summary of these service assessments:

1) The Historic Tornadoes of April 2011

During a 4-day period from April 25-28, 2011, more than 200 tornadoes occurred in five southeastern states. The deadliest part of the outbreak was the afternoon and evening of April 27, when a total of 122 tornadoes resulted in 313 deaths across central and northern Mississippi, central and northern Alabama, eastern Tennessee, southwestern Virginia, and northern Georgia. Three additional lives were claimed earlier by tornadoes in the pre-dawn hours of April 27 bringing the daily total to 316. There were 15 violent (Enhanced Fujita Scale 4 or 5) tornadoes reported. Eight of the tornadoes had path lengths in excess of 50 miles. Two of the tornadoes-one in northern Alabama and another that struck the Tuscaloosa and Birmingham areas in Alabama-each claimed more than 60 lives.

The National Weather Service (NWS) formed a service assessment team to evaluate its April 27 performance. To strengthen NWS relationships with other federal agencies involved with disaster work, for the first time this assessment had a co-leader from the Federal Emergency Management Agency (FEMA). One of the team's tasks was to assess societal impacts of this event. The service assessment document included 24 recommendations to address NWS performance, safety, and outreach programs. In addition, the team identified 14 best practices.

Significant tornado events also impacted portions of the southeast United States on April 15 and the St. Louis metropolitan area on April 22. A devastating tornado struck Joplin, Missouri on May 22. The NWS conducted regional service reviews following each of these three events. The NWS regional reviews for two of the events: the *North Carolina/South Carolina/Virginia U.S. Tornado Outbreak*, led by Mickey Brown (NWS Eastern Region Deputy Director); and the *St. Louis Metropolitan Area Tornado Event*, led by Rick Shanklin (Warning Coordination Meteorologist, NWS WFO Paducah, KY), are included in the service assessment document as appendices. The regional review for the *Joplin, Missouri, Tornado - May 22, 2011*, led by Richard Wagenmaker (Meteorologist in Charge, NWS WFO Detroit, MI), was publicly released in September 2011 and is referenced but not included in this service assessment document.

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Service Assessment Program – Continued from Page 5

This service assessment document was signed for the NWS Director, Jack Hayes, on December 9, 2011. The OCWWS Performance Branch released the report to the public on December 19, 2011.

2) Spring 2011 Mississippi River Valley Floods

This draft service assessment document presents findings and recommendations regarding NWS performance during the historic river flooding that occurred in the Mississippi River Valley during the spring of 2011. The areas most impacted were the lower reaches of the Ohio River and associated tributaries and areas from the confluence of the Mississippi River and Ohio Rivers at Cairo, IL downstream to the Gulf of Mexico.

A combination of runoff from upstream snowmelt and excessive spring rainfall combined to adversely impact property and commerce over a broad geographic area.

The assessment was briefed by the team leader to the NWS Corporate Board on January 10, 2012 and will be released on March 20th.

3) NOAA NWS Operations and Service Assessment during Hurricane Irene in August 2011

On Saturday, August 20, 2011 Hurricane Irene was a tropical wave east of the Lesser Antilles. Irene affected the U.S Virgin Islands and Puerto Rico first as a tropical storm and then strengthened into a Category 1 hurricane late Sunday night and on Monday morning, August 22. The storm continued to strengthen into a Category 2 hurricane and then began to weaken before making landfall near Cape Lookout, NC on the morning of August 27, 2011 as a Category 1 hurricane. After moving across the Outer Banks of North Carolina and extreme Southeastern Virginia, Irene traveled off the Eastern Seaboard until reaching Little Egg Inlet on the New Jersey Coast where it made landfall early Sunday morning, still as a Category 1 hurricane. By 9 am, Sunday morning, Irene, now a tropical storm with 65 mph winds, was centered over New York City. Irene continued to travel northeast through New England and reached the Canadian border as an extra-tropical cyclone, with sustained winds of 50 mph, around Midnight Sunday. Irene traveled through eastern Canada on Monday, August 29. In addition to producing strong, damaging winds along its path, Irene dropped copious amounts of rain, and produced damaging storm surges.

The assessment team focused on those locations most severely affected by the weather-related impacts of Irene. These include the U.S. Virgin Islands, Puerto Rico, and North Carolina to southeastern Canada.

The assessment was in raw draft form and a release date is pending.

Performance Branch Bids Farewell to Tish Soulliard

By Doug Young, NWS Headquarters

In February 2012, the Office of Climate, Water, and Weather Service's (OCWWS) Performance Branch made the difficult decision to further reduce its contract staff in response to additional budget cuts in Fiscal Year 2012. As a result, Tish Soulliard, a Scientific Analyst in charge of the National Precipitation Verification Unit (NPVU) departed her position on February 24th.

Tish, a 2001 graduate with highest honors in Oceanography from the Florida Institute of Technology, has been a nine year contractor with the OCWWS Performance Branch. Tish will be missed both as a Performance Branch team member and because of her job dedication. Since Tish was the sole contractor maintaining the NPVU, the additional loss to the NWS will be the indefinite suspension of any new NPVU activity. When informed about the suspension of the NPVU, Jim Hoke, Director of the Hydrometeorological Prediction Center, said "*the NPVU is a very worthwhile program to the NWS. It's especially important because it provides, on a national basis, QPF verification down to the WFO and RFC levels. To my knowledge there is no other source for this information. . .*" Jim continued by saying he hopes we are able to re-establish the NPVU at a later date.

The NPVU was formed from the recommendation of a committee established by the NWS Director in 1999 to review the Quantitative Precipitation Forecast (QPF) process. The committee believed one of the most important components of an effective national QPF program was a comprehensive, objective, and comparative verification system. In support of the QPF Assessment Team, implementation of a nationally approved precipitation verification system was accelerated for river forecast centers and weather forecast offices. The system was implemented over the contiguous United States with verification data made available in a timely fashion to all forecasters. The NPVU became operational on October 1, 2000, and launched its Web site shortly thereafter on October 4. Tish Soulliard has maintained and helped modernize the NPVU since April 2003.◉

How Agencies Can Use Data More Effectively

Federal Times, January 23, 2012

All federal program managers could run their programs better by analyzing their data, but it takes effort to begin, observes a new report co-sponsored by the Partnership for Public Service and the IBM Center for The Business of Government.

The report, "From Data to Decisions: The Power of Analytics," calls for a new emphasis on agencies having trained data analysts who work to solve problems and tell stories with the data.

For example, the Federal Aviation Administration's director of accident investigations, Tony Fazio, says its analysts are beginning to link hundreds of data sources and as a result: "This is one of the few programs that can now take all the information, then merge it and mine it to tell a story." The goal is to move "from solving the accidents to predicting the accidents."

Based on this report, I see four areas where government executives need to take actions to bring analytics to their workplaces: collect better data, conduct better analysis, make better decisions and take smarter action:

Collecting better data. Every agency collects data. Michelle Snyder, deputy chief operating officer for the Centers for Medicare & Medicaid Services, says the agency collects half a terabyte of data a week. But the challenge is how to turn those data into information that can drive decisions.

Leaders need to prioritize their data collection and sharing by linking data to clearly defined goals, and identifying what information is needed to track progress against them. They also need to assure the data are reliable.

The best model of a Web portal that includes interpretive tools is Recovery.gov, which tracks the spending of federal Recovery Act grant and contract monies. There, the data are widely shared, and the public and other users can comment on and correct them.

Conducting better analysis. Government executives must be able to make sense of the flood of new data with analytic tools that can help decision-makers and the public. This starts with setting clear goals and priorities, and linking them to measures of progress.

For example, the Obama administration has worked with agencies to identify a targeted number of high-priority performance goals. A new law requires agencies and the Office of Management and Budget to track the progress of these goals on a quarterly basis.

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How Agencies Can Use Data More Effectively - Continued from Page 8

Making better decisions. Government executives must use the new data and analyses effectively to make decisions and set priorities.

For example, the Housing and Urban Development and Veterans Affairs departments have developed a joint goal of reducing the number of homeless veterans by 59,000 by June. By sharing information and reassessing their approaches, they decided to change their focus from providing housing vouchers to ensuring veterans were housed.

This uncovered gaps between various programs which, in turn, allowed the two departments to make better decisions when targeting their financial and social services.

Taking smarter action. To create a data-driven, results-oriented mission environment, government executives must ensure their organizations have the ability to use the data to take smarter action.

For example, agencies that pioneered the use of predictive data, such as the Veterans Health Administration, have made significant progress in implementing nationally recognized clinical interventions and are nationally recognized for prevention and early detection of disease.

What happens next? Some see the next big step as standardizing the collection, reporting and use of financial and performance information so it can be shared across agency boundaries and across levels of government, as well as with nonprofit partners.

The model for this has been the approach to collecting and reporting Recovery Act spending data. Legislation is pending, and a recent report from a presidentially appointed task force endorses this approach.

But managers should not wait for legislation tomorrow when analytics can help them achieve better results today.

Gregory Greben is vice president for public sector business analytics and optimization at IBM.

If we had no winter, the spring would not be so pleasant; if we did not sometimes taste of adversity, prosperity would not be so welcome. ~ Anne Bradstreet- Poet

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Federal Times
Article from January 23, 2012
(by Gregory Greben)
www.federaltimes.com

Web Links

Stats on Demand

https://verification.nws.noaa.gov

NDFD Verification:

https://bestpractices.nws.noaa.gov/contents/ndfd-stats/verification/

(National Verification)

https://bestpractices.nws.noaa.gov/contents/ndfd-stats/wfosummary/

(WFO Verification)

Real-Time Forecast System:

http://rtvs.noaa.gov/

Questions and comments on this publication should be directed to Freda Walters.